Fact Sheet:

Facility Energy Decision System (FEDS)

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The Problem

Defense Energy Policy has mandated that Department of Defense (DoD) facilities reduce energy consumption and costs by 20% from 1985 to 2000, and Executive Order 12902 has mandated 30% reduction by 2005. To meet these goals, the DoD needed a resource planning tool to determine the minimum life-cycle configuration of energy-efficient end-use technologies at large installations. These types of analyses are very complex and time consuming because a DoD installation is a system that must be considered as a whole. Therefore, the analyses are best performed within an automated software system. Such a system existed in the Facility Energy Decision System (FEDS) software developed by Pacific Northwest Laboratory (PNL) for the Department of Energy (DOE). The system, however, did not include DoD building types and was in need of improvements in the user interface, pollution reduction estimating, automated input generation, and other aspects. The U.S. Army Construction Engineering Research Laboratories (CERL) has supervised the transition of FEDS into a useful DoD tool.

The Technology

FEDS is a flexible, high-performance analysis and simulation tool, which contains the algorithms and supporting data required for analyzing the economic potential

of energy efficient technologies at DoD facilities. More specifically, FEDS assists the analyst in the selection of an energy-saving technology configuration that will decrease the end-use energy consumption at a facility and, at the same time, minimize the total life-cycle cost (LCC) of the retrofit configuration. The software permits the energy analyst to perform fuel-neutral, technology-independent, integrated resource planning and acquisition. FEDS has already been used to generate optimal retrofit configurations for entire DoD installations.

An important feature of the FEDS system is that, when determining the minimum LCC configuration of end-use technologies, interactive effects between the energy systems within and between buildings are explicitly modeled. For example, when considering a compact fluorescent lighting retrofit, the model not only evaluates the change in lighting energy used, but also evaluates any effects the retrofit might have on the current heating and/or cooling configuration. In addition, the software tracks the total facility electrical demand to determine the effect of individual building energy retrofits on the total facility demand peak and performs the analysis within complex utility rate structures if necessary. These types of calculations are often ignored or simplified because of the complexity involved. This detailed modeling is an effective way of estimating the impact of a comprehensive set of retrofit technologies.

The FEDS system also allows the user to input two levels of data -- minimal and detailed. To get a quick (and less accurate) analysis, the user need only provide FEDS with a set of very high-level installation information, such as the facility's location, utility rates, building types and areas, etc. A specialized database that contains representative energy-system configuration and construction data is then used to infer those building parameters not explicitly provided by the user. This first pass minimal analysis is typically followed by a more detailed FEDS analysis. In this detailed analysis, the information that was previously inferred by the system is replaced and/or augmented with user-supplied details. The detailed information is gained by selecting prototypical buildings of a given building type and then auditing or viewing drawings of those buildings to determine more

accurately their respective energy-consumption characteristics. The data obtained is then used to replace as much of the inferred (default) data provided by FEDS as possible. This detailed analysis provides a more optimal retrofit technology configuration and, hence, a lesser LCC of the retrofit package.

Benefits/Savings

Use of the FEDS software will provide a more systematic and optimal energy reduction plan for DoD installations. Modeling the installation as a whole provides the minimum life-cycle cost of retrofit configurations. The potential economic savings resulting from resource optimization has been estimated at $8.5 billion (net present value) for the entire DoD. FEDS can assist in harvesting some of this potential for the DoD by providing a consistent and automated planning tool.

Status

Version 3.0 of FEDS, containing all of the capabilities discussed above, has been completed for DoD installations. Copies of the FEDS program may be obtained by contacting the DOE POC listed below.

Point of Contact

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Visit the CERL homepage at http://www.cecer.army.mil